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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/596,831 | 06/26/2006 | Hajime Matsumoto | 2008_0999 | 1087 |

7590 12/07/2009
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| EXAMINER |
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NGUYEN, KHANH TUAN

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| ART UNIT | PAPER NUMBER |
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1796

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| MAIL DATE | DELIVERY MODE |
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12/07/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/596,831 | Applicant(s) MATSUMOTO ET AL. | |
| | Examiner KHANH T. NGUYEN | Art Unit 1796 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>09/01/2006 and 02/27/2009</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Amendment

1. This application is a 371 of PCT/JP04/19323 (filed on 12/24/2004). The preliminary amendment filed on 06/26/2006 is entered and acknowledged by the Examiner. Claims 1-9 are currently pending in the instant application.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on JP 2003-431700 (filed on 12/26/2003), JP 2004-019074 (filed on 01/27/2004), JP 2004-019076 (filed on 01/27/2004), JP 2004-094275 (filed on 03/29/2004), JP 2004-094293 (filed on 03/29/2004), and JP 2004-285706 (filed on 09/30/2004). It is noted, however, USPTO received only a certified copy of these publications, but without English translation. Therefore, only filing date of 12/24/2004 of the PCT/JP04/19323 is granted according the MPEP.

Information Disclosure Statement

3. The information disclosure statements (IDS) filed on 09/01/2006 and 02/27/2009 have been considered. An initialed copy accompanies this Office Action.

Drawings

4. The drawing(s) filed on 06/26/2006 has been considered.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

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7. *Claim Interpretations: Independent Claim 1 is an ionic liquid that requires an anion of $[BF_3(C_nF_{2n+1})]^-$ wherein n is 1 to 4 and an ammonium cation having a formula of $[NR^1R^2R^3R^4]^+$. Independent Claim 9 is a method of producing said ionic liquid by mixing said anion with said ammonium cation.*

8. Claims 1-9 are rejected under 35 U.S.C. 102(e) as being anticipated by "A New Class of Hydrophobic Ionic Liquids: Trialcyl(2-methoxyethyl)ammonium Perfluoroethyl trifluoroborate" (hereinafter refer to as Zhou, Published on 06/21/2006). The instant prior art is provided in the PTO-1449 filed on 09/01/2006.

The applied reference has common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

9. Zhou teaches a hydrophobic ionic liquid useful in lithium (Li) batteries that consisting of $[R^1R^2R^3RNCH_2CH_2OCH_3]^+$ cation where R^1 , R^2 , and R^3 may be methyl (CH_3) or ethyl (C_2H_5)

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neutralized with an aqueous solution of perfluoroalkyl trifluoroborate $[R_fBF_3]^-$ anion where $R_f = C_2F_5$, $n-C_3F_7$, and $n-C_nF_9$. (See Page 886, Left Column). The $[R^1R^2R^3NCH_2CH_2OCH_3]^+$ cation is readable on the claimed of $[NR^1R^2R^3R^4]^+$ cation of formula (I) wherein R^1 , R^2 , and R^3 may be selected from methyl (CH_3) or ethyl (C_2H_5) is readable on the claimed R^1 , R^2 , and R^3 and $CH_2CH_2OCH_3$ is readable on the claimed R^4 when R^4 is an alkyoxylalkyl group. The perfluoroalkyl trifluoroborate $[R_fBF_3]^-$ anion where $R_f = C_2F_5$, $n-C_3F_7$, and $n-C_4F_9$ is readable on the claimed $[BF_3(C_nF_{2n+1})]^-$ where n is selected from 2 to 4.

The reference specifically or inherently meets each of the claimed limitations in their broadest interpretations. The reference is anticipatory.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-063934 (hereafter refer to as Takeda) in view of either U.S. Pat. 4,537,843 (hereinafter refer to as

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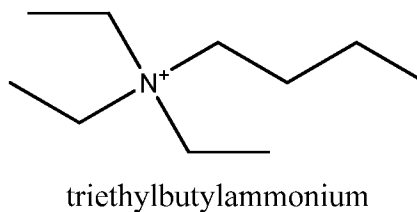
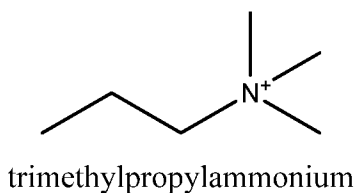
Shishikura) or U.S. Pub. 2006/0092597 A1 (hereinafter refer to as Pub '597).

Takeda teaches an electrolysis solution useful in electric double layer capacitor and lithium battery that comprising a boron compound containing fluoride ([0001]; [0011]) having a formula $[(R_f)_nBF_{4-n}]^-$ wherein R_f is a perfluoroalkyl group and n is an integer of 1 to 4 [0005]. The boron compound containing fluoride as suggested by Takeda is readable on the claimed $[BF_3(C_nF_{2n+1})]^-$ anion wherein n is 1 to 4. Takeda teaches the electrolysis solution further comprising of a cation (X^+) including triethylmethyammonium [0006].

Takeda failed to teach at least one organic ammonium ion having formula (1) as recited in the instant claims.

In an analogous art, Shishikura teaches an electrolyte used in secondary battery comprising of a symmetric quaternary ammonium $[NR^1R^2R^3R^4]^+$ cation and an anion including a boron containing fluoride compound such as BF_4^- (Col. 3, lines 10-35 and Col. 5, line 63). Shishikura further teaches the symmetric quaternary ammonium cation may include a triethylmethyammonium cation as suggested by Takeda or other cations including triethylpropylammonium and triethylbutylammonium (Col. 5, lines 47-49).

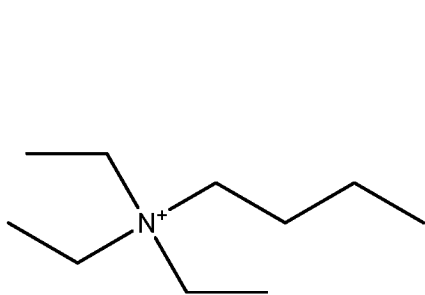
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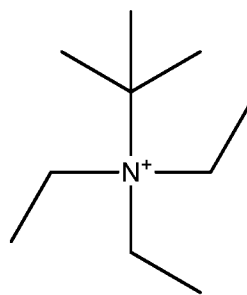
The triethylpropylammonium and triethylbutylammonium cations of Shishikura read on the claimed organic ammonium ion having a formula (I) wherein R^1 , R^2 , and R^3 are selected from methyl (CH_3) or ethyl (C_2H_5) and is R^4 is an alkyl group with 3 or more carbon atoms. Shishikura teaches battery comprising the above symmetric quaternary ammonium cation have advantageous over known battery in that (i) the energy density is high, (ii) the voltage levelness is good, (iii) the self-discharge is reduced and (iv) the recycle life is good (Col. 3, lines 49-57).

Likewise, Pub '597 teaches an electrolyte for an electrolytic capacitor [0014] comprising of Pub '597 further teaches the electrolyte comprising of tetrafluoroborate ion or perfluoroalkylborate ion [0033] and a quaternary onium salts [0019] include a triethylmethyammonium (para. [0021] line 2-3) as suggested by Takeda or other salts including triethyl-n-butylammonium and triethyl-t-butylammonium (para. [0021] line 12-13).

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triethyl-n-butylammonium



triethyl-t-butylammonium

The triethyl-n-butylammonium and triethyl-t-butylammonium salts of Pub '597 read on the claimed organic ammonium ion having a formula (I) wherein R^1 , R^2 , and R^3 are selected from ethyl (C_2H_5) and is R^4 is C_{3-10} linear or branched alkyl groups.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the ionic liquid and produce said ionic liquid as suggested by Takeda to comprising of the claimed $[BF_3(C_nF_{2n+1})]^-$ anion as suggested by Takeda and at least one cation such as triethylpropylammonium and triethylbutylammonium as suggested by either Shishikura or Pub '597 in order to provide the battery with the advantageous (i) to (iv) as suggest by Shishikura. The burden is upon the applicant to prove otherwise. *In re Fitzgerald*, 205 USPQ 594.

In view of the foregoing, the above claims have failed to patentably distinguish over the applied art.

Other Prior Art Cited

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. 6,072,692 teach an organic electrolytic solution used for double layer capacitor comprising a quaternary onium cation represented by $R^1R^2R^3R^4N^+$ (wherein R^1 , R^2 , R^3 and R^4 are the same or different and is C_{1-6} alkyl group) and a boron containing fluoride anion compound such as BF_4^- (Col. 3, lines 53-63).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHANH T. NGUYEN whose telephone number is (571) 272-8082. The examiner can normally be reached on Monday-Friday 7:00-4:00 EST PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark Kopec/
Primary Examiner, Art Unit
1796

/KTN/
Examiner
12/02/2009